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СЕЛЕКЦИОННОЕ И ИММУНОЛОГИЧЕСКОЕ ИЗУЧЕНИЕ ГЕКСАПЛОЙДНОЙ СИНТЕТИЧЕСКОЙ ПШЕНИЦЫ В ЮГО-ВОСТОЧНОМ КАЗАХСТАНЕ

В Юго-восточном Казахстане в 2014 году проводилось селекционное изучение гексаплойдной синтетической пшеницы (49 линий) селекции Киотского университета Японии и СИММИТ. Результаты исследований показали, что эти линий имеют высокий потенциал устойчивости к болезням на естественном инфекционном фоне. По агрономическим характеристике 5 линий могут быть использованы в селекции озимой пшеницы на юго-востоке Казахстана. Другие 44 линий мы планируем испытать как яровые формы в Северном регионе Казахстана.

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INVESTIGATIONS WITH ALFALFA IN IASS "OBTRAZTSOV CHIFLIK" – ROUSSE

Abstract

Alfalfa is prevalently allogamous species of genus Medicago, family Fabaceae. It is spread all over the world and grown on over 30 million hectares. Scientific experiments with this crop has started in the Agricultural Experimental Station "Obraztsovchiflik" in 1905.

During the period 1991-1994 18 accessionswith n = 16 of 10 speciesof Scientific Research Institution in Kazakhstan (KazNAUKazNII and Agriculture) were tested.

At the Institute a large number of Bulgarian and foreign trifoliolate and multifoliolate varieties and germplasm were studied. An evaluation of the most important traits were made and correlations and interrelationsbetween them were determined. Seven varieties were created at the Institute in the last 20 years. Six of them – Nadezhda 2, Prista 2, Prista 3, Prista 4, Roli and Prisra 5 are trifoliate. The greatest achievement of the Bulgarian alfalfa breeding was Mnogolistna 1 variety - the only Bulgarian multifoliolate variety (5-7 leafletsper leaf).

Key words: alfalfa, foreign trifoliolate and multifoliolate varieties, germplasm.

Alfalfa is prevalently allogamous species of genus Medicago, family Fabaceae. As a cultivated crop, Medicagosativa (common or blue alfalfa) autotetraploid with 2n = 4x = 32 is mainly grown in our country. The most important characteristic of alfalfa as cross-pollinating plant is its high degree of heterozygosity and any action which reduces it, stronglydecreases the vitality of the individuals and the population as a whole.

The perennial nature, high yield capability and adaptability of alfalfa allowit to beusedfor newpurposes, such as biofuel, phyto-recovery of soil and water, andevenincludingin the menuof the people.

The alfalfa is spread all over the world and grown on over 30 million hectares, and that circumstance requiresbreeding and developing varieties possessing different characteristics [1]. Evaluation of the European alfalfa germplasm for agronomic and physiological traits was conducted in Spain [2], the Czech and Slovak Republics [3], Italy [4], Bulgaria [5].

The investigations with alfalfa started in the early eighteenth century. In Bulgaria alfalfa was imported for cultivation in 1890 in Rousse farm "Obraztsovchiflik"and its

widespreadingwas began after the opening of the first Magnetic separator station in Plovdiv in 1926. Scientific experiments with this crop were carried out in the Agricultural Experimental Station “Obraztsovchiflik” in 1905. In the Experimental field the first alfalfa - Hungarian and Italian were tested. The results of the comparative studies were published in leaflets and were used for educational purpose and awareness of the farmers from Rousse region.A lot of seed analyses were carried out in 1920 – 1930 and the row spaces in alfalfa grown for seed were studied.A rich initial material oflocal populations was collected in 1956 at the Institute of Obraztsovchiflik – Rousse, too. In IASS “Obraztsovchiflik” were studied the main issues of alfalfa technology [6], the role of the natural pollinators of alfalfa - wild bees was investigated [7], significant conclusions concerning seed production were made and the influence of the meteorological conditions on the forage yield was evaluated. It was found, that for fifteen years period dry matter yield in alfalfa under conditions of North-East Bulgaria, without irrigation varied most strongly during the first and the forth year of cultivation. The Hydro-Thermal Coefficient from January to December effected positively on yield, comparing with the precipitation and temperature sums.

In 1990, while visiting our scientists in research institutes of Kazakhstan (KazNAU KazNII and Agriculture) 18 accessions with n = 16 of 10 species (*M. polymorpha, M. truncatula, M. turbinate, M. orbicularis, M. minima, M. murex, M. deniticulata, M. polymorpha var. brevispina, M. cirialis and Medicago sativa subsp. caerulea)* of genus Medicago were imported. During the period 1991-1994 seed was sown in the greenhouse and in the field to determine some morphological and agronomic traits. In 1992, three wild varieties were planted: Kapuagayskaya 80 and the other 2 from the Alma-Ata region[8]. The results obtained of their study indicated that those forms were not suitable for growing under the plane conditions of Northern Bulgaria.

The stability and variability of agronomic traits dry matter yield,plant height and visual assessment in trifoliate and multifoliolate populations were studied. An evaluation of the traitsfall dormancy, winterhardiness, regrowth rate after cutting, green mass yield, and seed yield were made and correlations and interrelationsbetween them were determined [9].

At the Institute a large number of Bulgarian and foreign multifoliolategermplasm were studied. It was found that the multifoliolate populations were characterized with good productive potential and were comparable to the standard trifoliate varietiesconcerningdry matter yield and seed yield. They did not differ significantly in disease resistance (*Pseudopeziza medicagin, Pseudopeziza jonesii Nannf, Fusariumoxysporumvar,medicaginis and Phytophtorasp.)*from the standard trifoliate varieties (Marinova, unpublished data).

As a result of long-term breeding work multifoliolate alfalfa MF 23 phenotype was developed on the basis of self pollination of AD-93 line (with three to seven leaflets per leaf). MF 23 was characterized with 23-24 leaflets per leaf and internodes shorter than 3 cm, compared to standard trifoliolate varieties. Increasing the leaves/stems ratio was considered as a method to improve forage quality in alfalfa (Medicago sativa L.).

Vlahova and colleagues have created low lignin lines as their breeding evaluation was made in the experimental fields of the Institute. The lines with highest productivity were selected for inclusion in synthetic populations.

The studies in recent years have showed that main factors for reducing the alfalfa stands were root rot and root damages caused by the larvae of longhorn alfalfa beetle (Plagionotus floralis Pall.) [10].

A significant increase of damages caused by different pathogens was observed. According many authors it was due to a significant increase of genetic homogeneity. The introduction of higheryielding varieties, distinguished with high agronomic performance, and the distribution of those varieties to large areas led to dangerous epiphytesdue to the increase of the genetic homogeneity, and to the highsusceptibilityof the host plant by the pathogen. Fungal diseases

were of significant importancefor the alfalfa, they caused damagesboth onabove-ground parts - leaves and stems, and on the root system. Bacterial and virous diseases also caused considerable damages.

More than 250 varietiesand alfalfa populations were tested in IAAS. It was found that none of them were resistant to *Rhizoctoniacrocorum* and *Verticiliumalbo-atrum*. Using infected by V. albo-atrum seedsto determine the disease resistance and inheritance of the trait in the progeny 20 foreign varieties, 20 local varieties and 14 crosses was studied [11]. The authors made the following conclusions: resistance was expressed in the progenyofsome plants; most strongly was reduced the natural resistance of our local alfalfa population; the availability of practically healthy plants was indicated that it waspossible to creat resistant varieties using breeding methods. Yield and quality of alfalfa production could be improved by creation of varieties resistant to diseases of economical significance. In that aspect, a base was placed which had to be used and enriched in further research. The alfalfa varieties, created in IASS "Obraztsovchiflik" have not beenstudied completely in terms of diseases attackshaving economical significance in Bulgaria. In recent years dynamics and development of alfalfa rust caused by *Uromyces striatus* have been studied. The performed screening on alfalfa varieties, included in the National List of Varieties during the period 2003-2006 identified them as sensitive to the disease. The alfalfa rust developesstronger in moist and warm years, usually in late summer and attackes stronger the older stands.

Studies on the damage caused by the larvae of *Plagionotus floralis* Pall suggested that in the roots of sick plants the rate of protein, crude fibers, Ca and total phenols increased, and the contents of P, Mg and sugars decreased.

Dry matter yield and quality of forage characterizing the agronomic value of varieties remained the most important characteristics in alfalfa breeding programs. The quality of alfalfa included chemical (contents of proteins and fibers in the dry matter), morphological (plant height, number of internodes, foliation) and nutritional value (digestibility, absorption, energy and protein value) [12].Data reported in Europe in the last few years showed that the increase of yield of dry vegetative mass has been still very limited, no more than 5% compared to the old varieties and local ecotypes [13, 14]. The good balance between yield and quality of foragewas the headline target of the research, as they were inversely correlated [15]. It was reported that the dry vegetative mass of high quality alfalfa varieties contained over 19% crude protein, below 31% acid detergent fibers and less than 41% neutral detergent fibers [16].

The most widespread in Bulgaria, duringthe 70s and 80s of the last century,variety – Nadezhda 2 was created in "Obraztsovchiflik".

Six varieties were created at the Institute in the last 20 years. Five of them – Prista 2, Prista 3, Prista 4, Roli and Prisra 5 are trifoliate. They were created after polycross method that ensured wide hereditary basis, good ecological plasticity and persistence of the stand. All five varieties were high productive, drought-resistant and winterhardiness.Dry matter yield per hectare under conditions without irrigation for a growing season is about 12-15 t and seed yield - from 1200 to 1500 kg for four years. Seed yield is high enough to provide a highly effective seed production. In the first year from 100 to 300 kg/ha seed was obtained, in the second and third year the yield reached 1000 kg/ha, and in the fourth and fifth years – 400-300 kg/ha.

The greatest achievement of the Bulgarian alfalfa breeding was Mnogolistna 1 variety - the only Bulgarian multifoliolate variety (5-7 leafletsper a leaf). It significantly exceededby quality the trifoliate varieties: 1.5% higher crude protein content, better digestibility, lower detergent fibers content. In years with normal or excessive precipitationit exceedes by dry matter yield the trifoliate varieties. The specific elements of varietal agrotechnicsof that variety are: slightly reduced sowing rate compared to that of the trifoliate varieties for forage, better insemination of plants in wide-row stand for seed production, with row spacing 45 cm and 70 cm and greater soil moisture requirement.

The results of the study of our varieties - Prista 2, Prista 3, Prista 4, and Mnogolistna 1 in Serbia, Montenegro, and the Czech Republic showed that they manifestedgood productivity, higher quality of the green mass and wide ecological plasticity [17]. Without irrigation, but in years with normal precipitation distribution, dry matter yield of Mnogolistna 1 per one year was 15-20 t/ha. Seed yield for the four years was averagely 1000-1500 kg/ha.

As a result of the new breeding of IASS "Obraztsovchiflik" and the good varietal policy of the Institute, the seed maintenance of that cropis at a very high level. Annually high yield of pre-basic and basic seed is obtained, resulting in a number of existing license agreements between the Institute and private seed producers, farms and companies for the production of alfalfa seed, which have shownthat about 50% of the seed production areas in Bulgaria were occupied by our varieties.Predicting the alfalfa flowering via regulationthe time of mowing was of significant importance for the increase of seed yield, so that pollination to take place in a warm, dry and sunny weather. The efficient production of alfalfa seed required optimum plant protection, adequate varietal structure, and appropriate agrotechnics.

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Сулейменова Н.Ш., Петкова Д.С., Маринова Д.Х., Иванова И.И.

РЕЗУЛЬТАТЫ ЭКСПЕРИМЕНТАЛЬНЫХ ИССЛЕДОВАНИЙ С ЛЮЦЕРНОЙ В IASS"ОБРАЗЦОВ ЧИФЛИК" – РУСЕ

Люцерна (лат. Medicago) является преимущественно перекрестноопыляющимся растением, принадлежащее к семейству Бобовые (Fabaceae). Она распространяется и выращивается на более 30 млн. га по всему миру. Научные эксперименты с этой культуры начались в сельскохозяйственной опытной станции "Obraztsovchiflik" в 1905 году За период 1991-1994 18 единиц хранения с n = 16 из 10 видов из Научно исследовательских учереждении Казахстана (KazNAU и KazNII Земледелия) были испытаны. В институте изучалось большое количество болгарских иностранных трехлепестных и многолисточковых сортов и зародышевой плазмы. Выявлены наиболее важные особенности (признаки) этой культуры и определены корреляции взаимосвязи между ними. За последние 20 лет в институте были созданы семь сортов этой культуры: Надежда 2, Приста 2, Приста 3, Приста 4, Роли и Приста 5 тройчатые. Самым большим достижением болгарской селекции люцерны был сорт Многолистна - 1 - единственный болгарский многолисточковый сорт (5-7 лепестков на лист).

Сулейменова Н.Ш., Петкова Д.С., Маринова Д.Х., Иванова И.И.

”ОБРАЗЦОВ ЧИФЛИК” – РУСЕ ЖАҒДАЙЫНДА БЕДЕ ДАҚЫЛЫНЫҢ СОРТТАРЫН ЭКСПЕРИМЕНТТІК ЗЕРТТЕУДІҢ НӘТИЖЕСІ

Беде (лат. Medicago) бұршақ(Fabaceae) тұқымдасына жататын шөптесін өсімдіктер. Ол әлемде 30 млн.га-дан астам аумақта өсіріледі. Бұл дақылды зерттеуге қатысты ғылыми тәжірибелер 1905 жылы “Obraztsov chiflik” ауылшаруашылық тәжірибелік станциясында жүргізіле бастады. 1991-1994 жылдар аралығында бұл дақылдың Қазақстаннан әкелінген 10 түрінен, қайталау саны n = 16 болатын 18 қосылысы зерттелінді. Институтта көп мөлшерде болгарлық және шетелдік үшжапырақшалы, сонымен бірге көпжапырақшалы сорттарына және ұрықтық плазмаға зерттеулер жүргізілген. Зерттеу барысында бұл өсімдіктің басты белгілері бөлініп алынып, олардың арасындағы корреляциялық байланысы анықталған. Соңғы 20 жылда институтта бұл дақылдың жеті сорты шығарылған: Надежда 2, Приста 2, Приста 3, Приста 4, Роли және Приста 5. Болгарлық селекцияның ең үлкен жетістігі – беденің болгарлық жалғыз көпжапырақшалы (1 жапырақта 5-7 жапырақша) сорты - Многолистна-1 болып табылады.

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РЕЗУЛЬТАТЫ ЭКОЛОГИЧЕСКОГО СОРТОИСПЫТАНИЯ КУКУРУЗЫ НА ПРОДУКТИВНОСТЬ В УСЛОВИЯХ ЮЖНОГО КАЗАХСТАНА

Аннотация

В статье приводятся результаты многолетних исследований по сортоизучению кукурузы. Установлены наиболее продуктивные гибриды и сорта, приспособленные к специфическим почвенно-климатическим условиям Южного Казахстана.

Ключевые слова: кукуруза, гибрид, сорт, экологическое сортоиспытание, продуктивность.

Введение

В основных направлениях экономического и социального развития Республики Казахстан на период до 2030 года одной из главных задач в сельском хозяйстве является неуклонное наращивание производства зерна. Основной путь решения этой задачи - повсеместное повышение урожайности зерновых культур, среди которых важная роль отводится кукурузе, как одной из наиболее урожайных и конкурентоспособных культур в условиях рынка.

Кукуруза одна из ведущих зерновых и кормовых культур в мировом земледелии. У нее огромные потенциальные возможности и при соблюдении технологии возделывания она может давать урожаи в 2-3 раза выше зернофуражных культур [1].